

**Five-Year Review Report
NL Industries, Incorporated Superfund Site
Pedricktown
Salem County, New Jersey**



**Prepared by:
U.S. Environmental Protection Agency**

September 2003

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name (from WasteLAN): NL Industries, Incorporated Site		
EPA ID (from WasteLAN): NJD061843249		
Region: 2	State: NJ	City/County: Pedricktown/Salem County
SITE STATUS		
NPL status: <input checked="" type="checkbox"/> Final <input type="checkbox"/> Deleted <input type="checkbox"/> Other (specify) _____		
Remediation status (choose all that apply): <input checked="" type="checkbox"/> Under Construction <input type="checkbox"/> Operating <input checked="" type="checkbox"/> Complete		
Multiple OUs?* <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	Construction completion date: N/A	
Has site been put into reuse? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		
REVIEW STATUS		
Lead agency: <input checked="" type="checkbox"/> EPA <input type="checkbox"/> State <input type="checkbox"/> Tribe <input type="checkbox"/> Other Federal Agency <u>PRP -Funded</u>		
Author name: Joseph Gowers		
Author title: Remedial Project Manager	Author affiliation: EPA	
Review period:** 04/09/1998 to 9/--/2003		
Date(s) of site inspection: 05/29/2003		
Type of review: <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <input checked="" type="checkbox"/> Post-SARA <input type="checkbox"/> Pre-SARA <input type="checkbox"/> NPL-Removal only </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <input type="checkbox"/> Non-NPL Remedial Action Site <input type="checkbox"/> NPL State/Tribe-lead </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <input type="checkbox"/> Regional Discretion </div>		
Review number: <input type="checkbox"/> 1 (first) <input checked="" type="checkbox"/> 2 (second) <input type="checkbox"/> 3 (third) <input type="checkbox"/> Other (specify)		
Triggering action: <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <input type="checkbox"/> Actual RA Onsite Construction at OU_____ <input type="checkbox"/> Actual RA Start at OU#_____ </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <input type="checkbox"/> Construction Completion <input checked="" type="checkbox"/> Previous Five-Year Review Report </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <input type="checkbox"/> Other (specify) </div>		
Triggering action date (from WasteLAN): 04 /09/1998		

* ["OU" refers to operable unit.]

** [Review period should correspond to the actual start and end dates of the Five-Year Review in WasteLAN.]

Does the report include recommendation(s) and follow-up action(s)? ☒ Yes ☐ No

Is human exposure under control? ☒ Yes ☐ No ☐ Not Yet Determined

Is site-related groundwater contamination under control? ☒ Yes ☐ No ☐ Not Yet Determined

Are the remedies protective of the environment ☒ Yes ☐ No ☐ Not Yet Determined

I. Introduction

This second five-year review for the NL Industries (NL), Incorporated site (Site), located in Pedricktown, Salem County, New Jersey, was conducted by Joseph Gowers, the U.S. Environmental Protection Agency (EPA) Remedial Project Manager (RPM) for the Site. This five-year review was conducted pursuant to Section 121 (c) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended, 42 U.S.C. §9601 et seq. and 40 CFR §300.430(f)(4)(ii), and in accordance with the Comprehensive Five-Year Review Guidance, OSWER Directive 9355.7-03B-P (June 2001). The purpose of a five-year review is to assure that implemented remedies protect public health and the environment and that they function as intended by the decision documents. This report will become part of the Site file.

The Site is being addressed in phases or operable units (OUs). OU2 addressed slag and lead oxide piles, debris and contaminated surfaces, and standing water which were found to be significant and continual sources of contaminant migration from the Site. OU1 addresses contaminated groundwater, soils and stream sediments at the Site.

II. Site Chronology

Table I - Chronology of Site Events

Event	Date
Lead smelting operations conducted at the Site by NL	1972 - 1982
NL cited by the New Jersey Department of Environmental Protection (NJDEP) for violations of state air and water regulations	1973-1980
NL ceases smelting operations at the Site	5/1982
Lead smelting operations conducted at the Site by National Smelting of New Jersey (NSNJ)	2/1983-1/1984
Final listing on EPA's National Priorities List (NPL)	9/1983
Administrative Order on Consent (AOC) for performance of a Site-wide Remedial Investigation and Feasibility Study (RI/FS) by NL issued	4/1986
RI/FS conducted	1986 - 1993
Removal Actions conducted by EPA	1989 - 1996
Operable Unit Two (OU2) Record of Decision (ROD) issued	9/27/1991
OU2 Explanation of Significant Differences (ESD) issued	3/1992

Event	Date
Unilateral Administrative Order (UAO) issued to Potentially Responsible Parties (PRPs) for performance of the OU2 Remedial Design and Remedial Action (RD/RA)	3/31/1992
OU2 Remedial Action performed	10/1992 - 9/1995
Operable Unit One (OU1) ROD issued	7/08/1994
AOC for performance of OU1 RD issued	6/10/1996
OU1 RD for soil and sediment conducted	6/1996 - 1/2000
First Five-Year Review completed	4/09/1998
Consent Decree finalizing settlement for PRP performance of the OU1 RA and Removal Action entered by the Federal Court	4/05/1999
OU1 ESD issued	6/21/1999
OU1 RA for soil and sediment conducted	1/18/2000 - 7/31/2003

III. Background

Physical Characteristics

The Site is situated on 44 acres of land in Pedricktown, Oldmans Township, Salem County, New Jersey. Active industrial and commercial facilities are located to the north, east and west of the Site. Penns Grove-Pedricktown Road lies immediately south of the Site. The nearest home is less than 1,000 feet from the Site property line. An active railroad bisects the Site. Approximately 16 acres of the Site is located north of the railroad tracks, including a closed 5.6-acre landfill. The southern 28 acres contain the industrial area and landfill access road. The West and East Streams, parts of which are intermittent tributaries of the Delaware River, border and receive surface runoff from the Site.

Land and Resource Use

From 1972 to 1984, NL, and subsequently NSNJ, recycled lead from spent batteries and other lead-bearing waste at the Site. The facility has been inactive since January 1984.

The Site, which is located in an industrial park, is currently zoned for industrial use and is expected to remain so into the future. However, the Site is currently surrounded by industrial, commercial and residential land uses. In evaluating potential risks posed by the Site, EPA considered the theoretical possibility of residential development.

The groundwater aquifer underlying the Site is classified as a Class II groundwater aquifer (potable water source) by the State of New Jersey, and is used for potable purposes in the vicinity of the Site. Groundwater flow in the water table aquifer in the vicinity of the Site is currently to the northwest.

History of Contamination

NL, and subsequently NSNJ, recycled lead from spent batteries and other lead-bearing waste at the Site. The batteries were drained of sulfuric acid, crushed and then processed for lead recovery at the smelting facility. The plastic and rubber waste materials resulting from the battery-crushing operation were disposed of in the on-Site landfill, along with slag from the smelting process. Operations at the Site resulted in the contamination of soil, stream surface water and sediment, and groundwater. Soil at the Site was contaminated with metals, primarily lead. In addition, elevated levels of lead, copper and zinc were detected in stream sediment and surface water. Groundwater contamination detected at the Site consists primarily of lead and cadmium, with a localized area where elevated levels of volatile organic compounds (VOCs) were detected.

Between 1973 and 1980, the NJDEP noticed NL with numerous violations of state air and water regulations. Water pollution violations were directed toward the battery storage area and the on-Site landfill. NJDEP conducted an air-monitoring program in 1980 that detected airborne quantities of lead, cadmium, antimony and ferrous sulfate produced by the smelting process, at levels exceeding the facility's operating permits. NL ceased smelting operations in May 1982. In February 1983, the plant was sold to NSNJ and smelting operations recommenced. NSNJ ceased operation in January 1984, and filed for bankruptcy in March 1984. When the facility ceased operating, surface contamination was left behind in the form of slag waste and lead oxide piles, drums and debris, contaminated building surfaces, and contaminated surface water and sediments in basements, pits and sumps.

Initial Response

The Site was proposed for inclusion on the NPL in December 1982 and finalized on the NPL in September 1983. In October 1982, NL entered into an Administrative Consent Order (ACO) with NJDEP to conduct a remedial program to address contamination of some Site soil, paved areas, surface water runoff, the on-Site landfill, and groundwater. In 1983, NSNJ entered into an amended ACO with NJDEP to clarify the environmental responsibilities of NL and NSNJ. Pursuant to the ACO, contaminated soil was removed from the wetland area adjacent to the facility, paved areas were cleaned before transfer of the facility to NSNJ and the on-Site landfill was closed.

In March 1989, EPA initiated a multi-phased Removal Action at the Site to address several conditions that presented a serious risk to public health and the environment. Phase I of the Removal Action, conducted in March and April 1989, consisted of construction of a chain-link fence to enclosed the smelting facility and encapsulation of slag piles to provide temporary protection from wind and rain erosion. Phase II of the Removal Action, initiated in November 1989, consisted of additional encapsulation of the slag piles, securing the entrances to the contaminated buildings, and removal of

over 40,000 pounds of the most toxic and reactive materials, including red phosphorus and metallic sodium, from the Site. During March 1991, EPA performed Phase III of the Removal Action. During this phase, damage to the perimeter fence was repaired and a new entrance gate was installed. In addition, the contents of all containers stored in the open were consolidated under an existing covered area at the rear of the facility, in order to reduce the potential for discharge. In July 1992, EPA conducted Phase IV of the Removal Action, which consisted of reinforcement of the slag bin retaining walls, which were in danger of collapse. Phase V of the Removal Action, which was initiated in the Fall of 1993, involved the removal of the most highly contaminated stream sediments from the West Stream.

Basis for Taking Action

High concentrations of metals were detected in slag and lead oxide piles at the Site. Lead was detected at concentrations as high as 130,000 parts per million (ppm) and 480,000 ppm in the slag and lead oxide piles, respectively. EPA determined that the potential for inhalation of contaminated dust from these piles was significant for potential receptors. Furthermore, runoff of this material via rain erosion was determined to be a mechanism for potential release of these contaminants into the environment. In addition, the concentrations of lead-contaminated dust on contaminated surfaces may have presented a significant risk to individuals downwind of the Site.

The potential for human exposure to metals and VOCs in groundwater was also determined to present a human health threat due to exceedence of EPA's risk management criteria. Finally, EPA determined that exposure to soil and sediment at the Site containing greater than 500 ppm lead may result in adverse effects for ecological receptors.

IV. Remedial Actions

OU2 Remedy Selection

The OU2 ROD for the Site was signed on September 27, 1991. The Remedial Action Objectives (RAOs) for the OU2 Early Remedial Action focus on preventing future release and migration of hazardous materials and eliminating the areas addressed under OU2 as sources of future contamination and exposure on and off Site.

The major components of the remedy selected in the OU2 ROD include the following:

- Solidification/stabilization and on-Site placement of the slag and lead oxide piles;
- Decontamination and off-Site treatment and disposal of debris and contaminated surfaces;
- Off-Site treatment and disposal of standing water and sediments; and
- Appropriate environmental monitoring to ensure the effectiveness of the remedy.

In March 1992, EPA issued an ESD which provided an explanation of a change which EPA made to a portion of the OU2 remedy. The 1992 ESD revised the OU2 remedy to permit off-Site disposal of the slag and lead oxide piles.

OU2 Remedy Implementation

In March 1992, EPA issued a Unilateral Administrative Order (UAO) to 31 PRPs for design and performance of the OU2 Early Remedial Action.

On October 19, 2002, CWM, a contractor for the PRPs, mobilized to the Site for slag stabilization activities. CWM began stabilization of the slag piles in November 1992. Stabilization of all of the slag piles was completed in June 1993. Off-Site disposal of the treated slag was completed in July 1993.

During February 1993, IDM, another contractor for the PRPs, mobilized to the Site to begin decontamination and demolition of the facility. On-Site structures dismantled as part of demolition activities included; the rotary kiln, baghouses, decasing and slag crushing buildings, battery crusher, truck lift, crushed battery conveyor, above-ground fuel tanks, refining building, office building, soda ash silo and underground storage tanks. Demolition of on-Site structures was completed by December 2003. Contaminated sediments and wash water collected at the Site during decontamination and demolition activities were shipped off-Site for treatment and disposal. Furthermore, on-Site concrete found to be non-hazardous was either utilized to backfill the building basements, left in place or sent off Site for recycling. Final grading and backfilling of the former industrial area was completed in August 1994.

In October 1994, the PRPs mobilized to the Site to remove lead-contaminated acid-resistant brick from the battery breaking yard. The remaining brick was subsequently sampled and additional acid resistant brick was excavated in January 1995. The excavated brick was disposed of off-Site in June 1995. The final inspection to ensure completion of the OU2 Early Remedial Action was conducted by representatives of EPA and NJDEP on July 24, 1995.

The OU2 RA Report, which signifies completion of the OU2 Early Remedial Action, was approved by EPA on September 26, 1995.

During the OU2 remedial action, material was disposed of or recycled in the following manner: 13,149.76 tons of slag were treated and disposed of off Site as non-hazardous waste; 1,914.8 tons of scrap metal were recycled; 1,592.2 tons of lead bearing material were sent to a secondary lead smelter for recycling; 1,486 tons of clean concrete were removed for crushing and beneficial use; 52.35 tons of asbestos containing material from the on Site buildings were disposed of at an approved non-hazardous landfill; 1,992.8 tons of material were disposed of at a hazardous landfill; and over 764,000 gallons of contaminated standing water and wash water were sent to DuPont Chambers Works for treatment.

OU1 Remedy Selection

The OU1 ROD for the Site was signed on July 8, 1994. The RAO for the OU1 remedy are as follows:

- To leave no greater than 500 ppm of lead remaining in site soils and stream sediments; and
- To restore the contaminated unconfined aquifer to drinking water standards for all contaminants.

The major components of the remedy selected in the OU1 ROD include the following:

- Excavation of all soils contaminated with lead above the remedial action objective of 500 ppm, treatment via solidification/stabilization of those soils classified as hazardous under the Resource Conservation and Recovery Act, and disposal of the treated soils along with non-hazardous soils in a landfill to be constructed on the Site;
- Removal of contaminated stream sediments above 500 ppm of lead from the East Stream and drainage channel north of Route 130 and treatment/disposal of the sediments in a manner similar to that described for soils above;
- Extraction and treatment of contaminated ground water with direct discharge of the treated ground water to the Delaware River; and
- Appropriate environmental monitoring to ensure the effectiveness of the remedy.

In June 1999, EPA issued an ESD which provided an explanation of a change which EPA made to a portion of the OU1 remedy. The 1999 ESD revises the OU1 remedy to permit off-Site disposal of all excavated soil and sediment.

OU1 Remedy Implementation

In June 1996, EPA entered into an AOC with five generator PRPs for design of the OU1 remedy. On January 13, 1997, the 1996 AOC was modified to require that the PRPs install and maintain silt fencing along the West Stream and on the north and west sides of the former plant area of the Site in order to mitigate the off-Site migration of Site-related contamination.

In order to expedite remediation of contaminated soil and sediment at the Site, EPA determined it appropriate to conduct the design of the soil and sediment component of the OU1 remedy separately from the groundwater component of the remedy. In September and October 1997, the PRPs' contractor, GeoSyntec, performed a pre-design investigation for soil and sediment. Data collected during this investigation regarding the extent of lead-contaminated soil and sediment was utilized to determine the approximate limits of the Soil and Sediment RA. The Design Report for Soil and Sediment was approved by EPA in January 2000.

The PRPs' contractor, ENTACT, mobilized to the Site during June 2000 to begin implementation of the Soil and Sediment RA. As part of the Soil and Sediment RA, 150,928 tons of contaminated soil and sediment was excavated, treated and disposed of at appropriate landfills. In addition, 10,887 tons of concrete was demolished, decontaminated and shipped to an off-Site facility for recycling. Finally, 182 tons of scrap metal and steel rebar generated during the RA was decontaminated and shipped to an off-Site facility for recycling. A final inspection of the Soil and Sediment RA was conducted by representatives of EPA and the NJDEP on May 29, 2003. With the exception of the need to apply mulch to a portion of the Site, no deficiencies were noted during the final inspection. The Operable Unit One Remedial Action Report for Soil and Sediment was approved by EPA on July 31, 2003, signifying completion of the Soil and Sediment RA.

Biological monitoring, in accordance the Biological Monitoring Plan approved by EPA on May 4, 2000, was initiated on July 14, 2000. The second year biological monitoring event was initiated on October 28, 2002. The required biological monitoring is being conducted to ensure that cleanup of Site soil and sediment to the OU1 remedial action objective of 500 ppm of lead is adequately protective of the environment. As part of this biological monitoring, toxicity testing is being conducted to evaluate whether the levels of lead remaining in sediment at the Site is expected to be toxic to aquatic receptors. In addition, lead levels in surface water, sediment and aquatic life determined through biological monitoring are being used to estimate potential hazards to wildlife.

During the pre-design phase of the groundwater component of the OU1 remedy, additional groundwater investigations were conducted from 1997 - 1999 in order to define current groundwater quality at the Site, and to determine whether modification of the selected groundwater remedy appeared to be appropriate. The results of these investigations indicated that groundwater quality had significantly improved at the Site since lead smelting operations ceased in 1984. Furthermore, further migration of groundwater contaminants since 1983 was not noted. Based upon the findings of these pre-design investigations, in January 2000, the PRPs proposed modifying the selected groundwater remedy to provide for injection of stabilizing agents into the aquifer to enhance naturally-occurring geochemical reactions, rather than extracting and treating contaminated groundwater. Upon evaluation of this proposed modification, EPA determined that additional investigations and treatability studies would need to be conducted at the Site to determine whether the modified groundwater remedy would be appropriate. Due to the impending start of the Soil and Sediment RA, EPA postponed additional groundwater investigations until after completion of the Soil and Sediment RA.

In April 2003, the PRPs submitted a groundwater monitoring plan which will provide for the installation of additional groundwater monitoring wells and the collection of groundwater samples in order to define current groundwater quality at the Site. This monitoring plan should enable completion of the design of the groundwater remedy. It may also show that an active pump and treat remedy is not necessary and that site contaminants are naturally attenuating.

System Operation/Operation and Maintenance

Operation and Maintenance activities associated with the Soil and Sediment RA will be conducted in accordance with the Operation and Maintenance Plan (O&M Plan), which was approved by EPA on May 29, 2003.

V. Progress Since the Last Five-Year Review

The first Five-Year Review (First Review) for the Site was completed in April 1998. The First Review determined that the remedies selected for the Site remained protective of human health and the environment. The First Review also recommended that the PRPs keep the Site secure, prevent contaminated groundwater beneath the Site from being used as drinking water and maintain silt fencing at the Site to prevent further spread of contaminated soil, until the remedies are implemented. The First Review also noted that the residential wells in the vicinity of the Site should be re-sampled to ensure that residents are not being exposed to Site-related contaminants at unacceptable levels. As recommended, the PRPs continue to maintain the Site fence in order to restrict access to the Site. In addition, silt fencing at the Site was maintained until all soil and sediment contamination was removed as part of the Soil and Sediment RA in order to minimize the spread of Site-related contamination. Finally, residential wells in the vicinity of the Site were re-sampled in July 1998 and January 1999 to ensure that residents are not being exposed to Site-related contaminants at unacceptable levels.

VI. Five-Year Review Process

Administrative Components

The five-year review team consisted of Joseph Gowers (RPM), Andy Crossland (Hydrogeologist), and Michael Sivak (Risk Assessor) of EPA.

Community Involvement

The EPA Community Involvement Coordinator (CIC) for the Site, Natalie Loney, published a notice in *Today's Sunbeam*, a local newspaper, on July 15, 2003, notifying the community of the initiation of the five-year review process. The notice indicated that EPA would be conducting a five-year review of the selected remedies to ensure that the remedies remain protective of public health and are functioning as designed; or will be protective, once implemented. It was also indicated that once the five-year review is completed, the results will be made available in the Site repositories. In addition, the notice included the RPM's address and telephone number for questions related to the five-year review process or the NL Industries, Inc. Site. A similar notice will be published when the review is completed.

Document Review

The documents, data, and information which were reviewed in completing this five-year review are summarized in Table 3 (attached).

Data Review

Soil and Sediment Sampling

Soil and sediment sampling conducted as part of the Site-wide RI/FS demonstrated the presence of lead in Site soil at concentrations up to 12,700 ppm, and in sediment from the West Stream at concentration up to 23,700 ppm. In September and October 1997, during design of the Soil and Sediment component of the OU1 remedy, the PRPs' consultant performed additional soil and sediment sampling at the Site and along the West Stream to confirm data collected during performance of the RI/FS. This data confirmed the presence of lead in soil and sediment at concentrations greater than the 500 ppm cleanup level established in the OU1 ROD. During performance of the Soil and Sediment RA, the PRPs were required to collect and analyze soil and sediment confirmation samples to demonstrate that the 500 ppm cleanup level for lead was achieved. Soil and sediment confirmation sampling was conducted by establishing a 100-foot by 100-foot grid at the Site and collecting confirmation samples from two grid nodes for each grid. The results of this confirmation sampling demonstrate that soil and sediment containing lead at concentrations greater than 500 ppm does not remain at the Site.

In August 2000, during performance of the Soil and Sediment RA, the PRPs' contractor discovered two areas at the Site which contained hydrocarbon-stained soil. As required by EPA, the PRPs collected confirmation samples from these areas of the Site in September 2002. The results of these samples indicated that total petroleum hydrocarbon and volatile organic compound concentrations in this soil was below New Jersey's Soil Cleanup Criteria. Therefore, remediation of this soil was not required.

Biological Monitoring

The results of the baseline biological monitoring event, initiated during the Summer of 2000 prior to cleanup of Site soil and sediment, indicated that ecological receptors could be negatively impacted by exposure to lead-contaminated soil and sediment. The results of the second year biological monitoring event were recently submitted to EPA and are currently being reviewed.

Groundwater Sampling

Groundwater sampling conducted as part of the RI/FS demonstrated the presence of elevated levels of lead and cadmium in the unconfined aquifer beneath the Site, as well as a localized area of elevated levels of volatile organic compounds. During the RI/FS, lead and cadmium were detected in groundwater at concentrations up to 4,400 ppb and 173 ppb, respectively. 1,1-dichloroethane, 1,1-dichloroethene, tetrachloroethene and vinyl chloride were detected locally at concentrations up to 210

ppb, 210 ppb, 210 ppb, and 76 ppb, respectively. In September and October 1997, the PRPs consultant resampled select monitoring wells at the Site, primarily to determine current groundwater quality. The results of this sampling event indicated the presence of lead and cadmium at concentrations up to 328 ppb and 193 ppb, respectively. Furthermore, 1,1-dichloroethane, 1,1-dichloroethene, tetrachloroethene and vinyl chloride were detected at concentrations up to 11 ppb, 13 ppb, 2.9 ppb and 11 ppb, respectively. In 1998 and 1999, the PRPs' consultant collected additional groundwater samples from select monitoring wells at the Site. During this sampling event, lead and cadmium were detected at concentrations up to 281 ppb and 383 ppb, respectively. These sampling results indicate that concentrations of lead, cadmium and volatile organic contaminants in groundwater beneath the Site, as of the 1999 groundwater sampling event, exceeded applicable drinking water and groundwater quality standards. However, these sampling results also demonstrate a significant decline in the levels of lead and volatile organic contaminants in groundwater beneath the Site from 1989 to 1999. This decline in groundwater contaminant concentrations may have resulted due to the removal of source material from the Site as part of the OU2 RA, which was conducted subsequent to groundwater sampling performed as part of the RI/FS. As indicated above, the PRPs intend to install additional monitoring wells at the Site and conduct additional groundwater sampling in the near future to determine current groundwater quality conditions.

Site Inspection

An inspection of the Site was conducted on May 29, 2003 by the RPM, the U.S. Army Corps of Engineer's representative who provided oversight of the Soil and Sediment RA, NJDEP's Case Manager and representatives of the PRPs. The purpose of the inspection was to assess whether the Soil and Sediment component of the OU1 remedy had been constructed as designed as well as to determine whether current conditions at the Site are protective of human health and the environment.

During this Site inspection, it was determined that, with the exception of the need to apply mulch to a portion of the Site, the construction of the Soil and Sediment component of the OU1 remedy had been completed. Furthermore, the existing security fence appeared to be in good repair and is expected to deter trespassing. A warning sign was also present on the front gate. Security measures at the Site appeared to be adequate, with the exception of missing caps and locks on some Site wells. The PRPs should have caps and locks installed on all wells. Signs of trespassing were not observed during the Site inspection.

Interviews

An interview was conducted with Mr. Paul Harvey of NJDEP on September 3, 2003. Mr. Harvey did not express any concerns with regards to cleanup of the Site. However, he did express a desire to expedite implementation of the work provided for in the April 2003 groundwater monitoring plan.

An interview was also conducted with Mr. Jeffrey Leed, of Leed Environmental, Inc., the PRPs' technical coordinator for the Site. During this interview, Mr. Leed expressed several concerns on the part of the Pedricktown Site Group PRPs regarding remedial efforts at the site. As indicated above, in January 2000, the PRPs proposed modifying the selected groundwater remedy to provide for injection of stabilizing agents into the aquifer to enhance naturally-occurring geochemical reactions, rather than extracting and treating contaminated groundwater. Now that the Soil and Sediment RA is complete, the PRPs have expressed an interest in resolving the scope of the groundwater remedy. Mr. Leed also expressed an interest on the part of the PRPs in meeting with EPA to discuss the scope and necessity of the biological monitoring being conducted pursuant to the EPA-approved Biological Monitoring Plan.

VII. Remedy Assessment

Question A: Are the remedies functioning as intended by the decision documents?

A review of Site-related documents, ARARs, risk assumptions, monitoring data and the results of the Site inspection indicates that the remedies are functioning as intended by the RODs, as modified by the ESDs, or will function as intended by the decision documents, once implemented. The objective of the OU2 remedy was to prevent future release and migration of hazardous materials present at the Site and to eliminate these contaminants as sources of future contamination and exposure on and off Site. As part of the OU2 remedy, 13,149.76 tons of lead-bearing slag, 1,592.2 tons of other lead-bearing materials, and 1,992.8 tons of hazardous material were permanently removed from the Site and either disposed of at a landfill or recycled. Therefore, the potential for future release of or exposure to these materials, or for these materials to serve as a source of future contamination has been mitigated.

The objectives of the OU1 remedy are to leave no greater than 500 ppm of lead remaining in soil and stream sediments and to restore the contaminated unconfined aquifer to drinking water standards. The soil and sediment component of the OU1 remedy, which was considered complete on July 31, 2003, resulted in the excavation and off-Site disposal of all soil and sediment containing greater than 500 ppm of lead. In fact, the average concentration of lead remaining in soil and sediment in remediated areas, based upon post-excavation soil and sediment sample results, is less than 400 ppm. Furthermore, a fence is maintained around the Site to restrict access. Biological monitoring, in accordance with the approved Biological Monitoring Plan, will be conducted for another three years to ensure that implementation of the soil and sediment component of the OU1 remedy has provided for protection of the environment.

The groundwater component of the OU1 remedy has yet to be implemented. While groundwater contaminant levels in the unconfined aquifer beneath the Site have declined since selection of the OU1 remedy, EPA believes that groundwater contaminant levels in the unconfined aquifer still exceed drinking water standards and/or groundwater quality standards. As indicated above, additional monitoring wells will be installed at the Site and additional groundwater monitoring will be conducted in the near future to define current groundwater quality. Implementation of the groundwater component of

the OU1 remedy is expected to be protective over the long term, as it is expected to restore the unconfined aquifer to the more stringent of drinking water standards or groundwater quality standards.

The results of groundwater sampling conducted at the Site between 1997 and 1999 indicate that a groundwater contaminant plume is not migrating from the Site. Furthermore, the Site is fenced and groundwater directly beneath the Site is not being used for potable purposes. Therefore, exposure to Site-related groundwater contamination while the groundwater component of the OU1 remedy is being designed and implemented is not anticipated.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy.

Land use is not expected to change during for the next five years, the period of time considered in this review, and is expected to remain commercial/industrial for the Site property and residential for most of the remediated properties adjacent to the West Stream. The land use considerations, exposure assumptions, and potential exposure pathways considered in the baseline human health risk assessment are still valid. The 500 ppm remedial action objective for lead in soil and sediment is currently considered protective for commercial/industrial use of the Site property. However, EPA currently believes that a cleanup of soil and sediment to 400 ppm of lead may be necessary to protect more sensitive populations (e.g., children) associated with other land uses, including residential use of property.

EPA's evaluation of the results of post-excavation soil samples collected at the Site property and on remediated properties adjacent to the West Stream as part of the Soil and Sediment RA indicates that Site cleanup efforts have resulted in the cleanup of soil to an average lead concentration of less than 400ppm. Therefore, while the cleanup level of 500 ppm of lead selected in the OU1 ROD may no longer be considered protective for land used for other than commercial or industrial uses, EPA has determined that the Soil and Sediment RA resulted in cleanup of soil and sediment to levels that would be protective for residential use of the remediated properties adjacent to the West Stream. In addition, EPA believes that the Soil and Sediment RA resulted in cleanup of soil on the Site property to levels which will permit unrestricted use of the property, with the exception of the on-Site landfill, which is being maintained by NL Industries, Inc. pursuant to the 1982 ACO with NJDEP.

As indicated above, biological monitoring, in accordance with the approved Biological Monitoring Plan, will continue to be conducted annually for another three years. This data will be used to evaluate whether the implementation of the soil and sediment component of the OU1 remedy has provided for adequate protection of the environment. If this data indicates that performance of the OU1 remedy may not have provided for adequate protection of the environment, then implementation of further

remedial measures may be considered.

While one of the RAOs specified in the OU1 ROD is to restore the groundwater in the unconfined aquifer to drinking water standards, the ROD defines the specific cleanup standard for each contaminant of concern as the more stringent of the applicable drinking water standard or groundwater quality standard. The groundwater quality standards and drinking water standards in effect at the time of the OU1 ROD are summarized in Table F of the ROD. Since the time of the ROD, several groundwater quality standards and drinking water standards have been revised. Therefore, a revised list of drinking water standards and groundwater quality standards is presented in Table 4. The RAO for the groundwater component of the OU1 remedy will be to restore groundwater quality in the unconfined aquifer to the more stringent of drinking water standards or groundwater quality standards presented in Table 4.

Question C: Has any other information come to light that could call into question the protectiveness of the remedies?

There is no information that calls into question the protectiveness of the OU1 and OU2 remedies.

VIII. Recommendations and Follow-Up Actions

Remedial activities and environmental monitoring is ongoing at the Site. Various modifications and adjustments of these efforts will occur from time to time. Several suggestions can be found in previous sections of this report. There are no recommendations or follow up actions associated with protection as a result of this review.

IX. Protectiveness Statement

Currently, there is no known adverse exposures to human or environmental receptors from Site contaminants, and none is expected over the next five years. Implementation of the OU2 remedy has provided for protection of public health and the environment through the removal of lead-bearing waste from the Site, thereby eliminating the possibility of exposure to this waste. In addition, performance of the soil and sediment component of the OU1 remedy has provided for protection of public health and the environment by cleaning up lead contaminated soil and sediment to levels which are deemed protective for even the most sensitive human populations. Overall, the OU1 remedy is expected to be fully protective of human health and the environment, once the groundwater component has been implemented and groundwater cleanup goals have been achieved. However, the results of groundwater sampling conducted from 1997 through 1999 do not indicate that groundwater contamination is migrating from the Site. In addition, groundwater beneath the Site is not being used for potable purposes. Therefore, exposure to Site-related groundwater contamination while the groundwater component of the OU1 remedy is being designed and implemented is not anticipated. As indicated above, EPA anticipates that groundwater sampling will be conducted in the near future to define current groundwater quality beneath and in the vicinity of the Site.

While the soil and sediment component of the OU1 remedy is protective of the environment, the Biological Monitoring Plan will provide for further evaluation of environmental conditions. If it is found that lead levels remaining in Site soil and sediment after implementation of the Soil and Sediment RA are having or are expected to have an unacceptable impact on ecological receptors, then implementation of further remedial measures may be considered.

X. Next Review

The next five-year review for the NL Industries, Incorporated Site should be completed by September 2008.

Approved:

Table 3: Documents, Data, and Information Used in Completing Five-Year Review	
-	Remedial Investigation and Feasibility Study Report, O'Brien & Gere, October 1990
-	Operable Unit Two Record of Decision, EPA, September 1991
-	Operable Unit Two Explanation of Significant Differences, EPA, March 1992
-	Operable Unit One Record of Decision, EPA, July 1994
-	Operable Unit Two Remedial Action Report, EPA, September 1995
-	First Five-Year Review Report, EPA, April 1998
-	Phase I Groundwater Evaluation Technical Memorandum, GeoSyntec, June 1998
-	Operable Unit One Explanation of Significant Differences, EPA, June 1999
-	Phase II Groundwater Evaluation Technical Memorandum, GeoSyntec, January 2000
-	Operable Unit One Remedial Action Report for Soil and Sediment, Entact, July 2003
-	Comments from Andy Crossland, EPA Geologist, February 2003
-	Comments from Michael Sivak, EPA Risk Assessor, August 2003

TABLE 4
CURRENT GROUNDWATER ARARs

Contaminant	MCL (ppb)	GREATER OF NJGWQS or PQL (ppb)
Acetone		700
Bis-(2-ethylhexyl)phthalate		30
Chloroform		6
1,2-Dibromomethane		
1,1-Dichloroethane	50	70
1,1-Dichloroethylene	2	2
1,2-Dichloropropane	5	1
Ethylbenzene	700	700
Naphthalene	300	
N-Nitroso-di-n-propylamine		20
Tetrachloroethylene	1	1
Toluene	1000	1000
1,1,1-Trichloroethane	30	30
1,2,4-Trimethylbenzene		
1,3,5-Trimethylbenzene		
Vinyl Chloride	2	5
Xylene(s) (total)	1000	40
Antimony	6	20
Arsenic (total)	10	8
Beryllium	4	20
Cadmium	5	4
Chromium (total)	100	100
Copper	1300*	1000
Cyanide	200	200
Lead (total)	15*	10
Mercury (total)	2	2
Nickel (soluble salts)		100
Selenium (total)	50	50
Silver		
Thallium	2	10
Zinc		5000

* Action Level

Note: For each listed contaminant, the more stringent of the MCL or the NJGWQS applies.

Table 5: Acronyms used in this document	
AOC	Administrative Order on Consent
ACO	Administrative Consent Order
CIC	Community Involvement Coordinator
EPA	U.S. Environmental Protection Agency
ESD	Explanation of Significant Differences
FS	Feasibility Study
FFS	Focused Feasibility Study
MCL	Maximum Contaminant Level
NCP	National Contingency Plan
NJDEP	New Jersey Department of Environmental Protection
NJGWQSs	New Jersey Groundwater Quality Standards
NSNJ	National Smelting of New Jersey
O&M	Operation & Maintenance
OU1	Operable Unit One
OU2	Operable Unit Two
ppm	parts per million
PRP	Potentially Responsible Party
RA	Remedial Action
RAOs	Remedial Action Objectives
RD	Remedial Design
RD/RA	Remedial Design/Remedial Action
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
UAO	Unilateral Administrative Order
VOCs	Volatile Organic Compounds